



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/720,730	12/29/2000	Koichi Watanabe	017447/0170	3938

22428 7590 08/18/2010
FOLEY AND LARDNER LLP
SUITE 500
3000 K STREET NW
WASHINGTON, DC 20007

EXAMINER

IP, SIKYIN

ART UNIT	PAPER NUMBER
----------	--------------

1793

MAIL DATE	DELIVERY MODE
-----------	---------------

08/18/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 09/720,730	Applicant(s) WATANABE ET AL.	
	Examiner Sikyln Ip	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 December 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,8,10,20,24,25 and 27-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,8,10,20,24,25 and 27-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3, 8, 10, 20, 24-25, and 27-29 are rejected under 35 U.S.C. § 103 as being unpatentable over USP 5693203 to Ohhashi et al (col. 6, lines 32-63) in view of applicant's admission (Rule 132 declaration filed on April 12, 2004, items 3-4) or USP 4720300 to Nishizawa et al, and further in view of acknowledged prior art admission in instant specification page 2, lines 1-28.

Ohhashi discloses the features including the claimed backing plate (col. 4, lines 65-67), Nb sputtering target (col. 4, lines 61-64), grain size (col. 6, lines 1-20), and hot pressing temperature (col. 2, line 60 – col. 3, line 7). Ohhashi discloses uniformity of recrystallized structure of sputtering target would be destructured by (1) Explosive bonding, hot rolling and (3) Grooved process (col. 3, lines 35-51 and col. 4, lines 9-26). These examples show that recrystallized structure of sputtering target is expected in

Art Unit: 1793

sputtering target taught by Ohhashi. The recrystallization temperature varies with material which is contemplated within ambit of ordinary skill artisan to use the conventional recrystallization temperature for known material in order to obtain a recrystallized structure. Ohhashi also discloses a sputtering target structure (Figure 1). Ohhashi does not disclose the % of grain deviation and O and/or Ta content dispersion in the target. However, sputtering target taught by Ohhashi is directed to uniform microstructure which requires uniform grain size and no or little diffusion of their constituent atoms (col. 6, lines 32-62). Thus, uniform grain size meets the claimed grain size range. Ohhashi does not disclose O and Ta contents. But, claimed Ta concentration is merely conventional in crude niobium metal (Nishizawa, Tables 1, 3, or 4). Moreover, applicant's admission in Rule 132 declaration, items 3-4, acknowledges that Ta and O are inevitable impurities that exist even in high purity Nb sputtering target. In view of applicant's admission, ordinary skill artisan would recognize Nb sputtering target of Ohhashi would inherently possess Ta and O as inevitable impurities. Since Ta and O are inevitable impurities, their dispersion would be uniform in Nb sputtering target. Thus, the dispersion % of said O and Ta is zero. Moreover, difference in degree of purity itself does not predicate patentability. In re King, 43 USPQ 400 and In re Merz, 38 USPQ 143 and In re Cofer, 354 F2d 664, 148 USPQ 268 (CCPA 1966).

With respect to the limitation

~~being respectively defined by the following equation, for respective measured content values~~
“ ~~of 9 specimens sampled at respective predetermined positions in the target:~~ ” in claim 1, for example, first it is a product-by-processing step which carries insignificant patentable weight if it does not change the structure/property of the final product or claimed structure/property of the final product is disclosed by prior arts. Second, said step

Art Unit: 1793

merely measure the dispersions of Ta and O impurities which are already in the target if they do exist. Third, in said step, the number of samplings at various positions in the target would not affect the dispersion % when the dispersion of Ta and O impurities are uniform in the target. The same first reason is also applied to steps of melting and plastic working.

With respect to the dispersion % expression, that it is well settled that there is no invention in the discovery of a general formula if it covers a composition described in the prior art, *In re Cooper and Foley* 1943 C.D. 357, 553 O.G. 177; 57 USPQ 117, *Taklatwalla v. Marburg*, 620 O.G. 685, 1949 C.D. 77, and *In re Pilling*, 403 O.G. 513, 44 F(2) 878, 1931 C.D. 75.

With respect to claimed use of the Nb sputtering target as liner material to Al, acknowledged prior art admission discloses the use of the Nb as liner material to Al in the same field of endeavor or the analogous metallurgical art (Instant specification, page 2, lines 20-24). The resistivity of interconnection file of semiconductor memories is required to be $4 \mu \Omega \text{ cm}$ or less (specification, page 2, lines 25-28). Therefore, it would have been obvious to one having ordinary skill in the art of the cited references at the time the invention was made to use Nb sputtering target as liner material and with resistivity $4 \mu \Omega \text{ cm}$ or less as taught by acknowledged prior art admission in order to reduce the interconnection resistance and improve reflow characteristics of Al (See instant specification page 2, lines 20-24). *In re Venner*, 120 USPQ 193 (CCPA 1958), *In re LaVerne, et al.*, 108 USPQ 335, and *In re Aller, et al.*, 105 USPQ 233.

Response to Arguments

Applicant's argument filed December 30, 2009 have been fully considered but they are not persuasive.

Ohhashi, however, fails to disclose the feature of claim 1 of "wherein the sputtering target is bonded with a backing plate made of Al or an Al alloy by hot-pressing at a

Applicants argue that "temperature in a range of 400 to 600°C." ~~Ohhashi discloses a three-layer sputtering target~~ But, applicants' attention is directed to col. 2, line 60 to col. 3, line 7 of Ohhashi pasted below that hot-press at recited temperature is conventional.

50 marily explained. Other bonding methods referred to as employable are hot press, HRP, and hot roll methods. Taking the hot press method for example, it is described as comprising the steps of working and machining, e.g., an Al-1% Si alloy as the first metal member (sputtering material) and
55 oxygen-free copper as the second metal member (support), both to relatively simple shapes, and bonding the two members by hot pressing at 300°-500° C. for 60 minutes,

3

whereby a diffusion layer of about 2 μm thickness is said to be formed, and thereafter machining the first and second metal members (sputtering material and support) thus bonded together to final configurations. It is also stated to the effect that alternatively the first and second metal members, having been machined to desired shapes may be bonded by explosive welding.

Moreover, the invention defined in a product-by-process claim is a product, not a process. In re Bridgeford, 357 F. 2d 679, 149 USPQ 55 (CCPA 1966) and MPEP § 2113. It is the patentability of the product claimed and not of the recited process steps which must be established. See In re Brown, 459 F. 2d 531, 173 USPQ 685 (CCPA 1972). The guidance that has been provided by court on this matter is

[i]f the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

See In re Thorpe, 777 F.2d 695, 227 USPQ 964, 966 (Fed. Cir. 1985). When applicant's and prior art's products are to be identical or substantially identical, the

burden shifts to applicant to provide evidence that the prior art product does not inherently possess the claimed properties. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977); In re Marosi, 710 F.2d 799, 803 (Fed. Cir. 1983); In re Fessmann, 489 F.2d 742, 745 180 USPQ 324, 326 (CCPA 1974); and In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980).

Applicants' argument with respect to the film resistivity is noted. But, said recited resistivity is standard. Moreover, applicants have not show by factual evidence that the sputtering target of Ohhashi cannot achieve said resistivity.

25 When considering an application in the next generation
semiconductor memories such as DRAMs of an integration rate
of 256Kbit or 1Gbit or more, resistivity of an
interconnection film is demanded to be $4\mu\Omega\text{cm}$ or less, ~~for~~

2

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. USP 5409862 to Wada et al discloses high purity Nb material as liner material (PTO-1449, Figure 11 and col. 11, line 25 to col. 12, line 42).

Applicant is reminded that when amendment and/or revision is required, applicant should therefore provide a concise explanation and support with page and line number in the specification for any amendments made to the disclosure. See 37 C.F.R. Part §41.37 (c)(1)(v).

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Ip whose telephone number is (571) 272-1241. The examiner can normally be reached on Monday to Thursday from 5:30 A.M. to 4:00 P.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Roy V. King, can be reached on (571)-272-1244.

Art Unit: 1793

The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Sikyin Ip/
Primary Examiner, Art Unit 1793

August 16, 2010